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AUTHOR Cowan, J. Ronayne
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ABSTRACT

One of the several causal mechanisms for errors made by adult second language learners is interference from the native language. This paper attempts to account for the cognitive nature of interference by proposing two psycholinguistically based principles that will explain various types of production and perception errors made of second language learners. The operation of the principles is then documented with examples from three different language learning contexts: native speakers of English learning Hausa yes - no questions, Persians learning English nominal compounds and relative clauses, and native speakers of English learning to read German. (Author)

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Toward a Psychological Theory of Interference in Second Language Acquisition[1]

J Ronayne Cowan
University of Illinois

During the past decade, the major thrust of psycholinguistic research has been the investigation of how children acquire their native language. Now it would appear that psycholinguists are gradually becoming interested in exploring the cognitive processes recruited by adults engaged in learning second languages. The data relevant to researching this topic are the errors made by the learner in his attempts at meaningful communication in the second language (Weinreich 1953, Corder 1967, Selinker 1972). There are numerous precedents for using this type of data. Speech errors committed in the native language have provided some of the most useful evidence for formulating hypotheses regarding the nature of the mechanism's underlying speech production (Lashley 1951, Hockett 1967, 1970, Boomer and Laver 1968, Laver 1969, Mackay 1969, 1970, Nooteboom 1969), the psychological reality of linguistic rules (Fromkin 1971, Steinberg 1973), and the perceptual strategies brought to bear in the comprehension of linguistically complex structures (Blumenthal 1967, Bever 1970).

Obviously, no single mechanism can be the source of all speech errors made by second language learners. At least, four major causes have been recognized: (1) interference from the native language, (2) general learning strategies similar to those manifested in first language acquisition, such as overgeneralization of linguistic rules, (3) the context of the learning situation cf. Selinker's (1972)

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"transfer of training" errors, and (4) emotional factors connected with the pressure of communication, e.g., the "strategies of communication" suggested by Selinker. There may also be minor mechanisms at work, such as hypercorrection, confusion of cognates, and "holophrase learning," cf. Jain (1969).

The second of these major causal mechanisms--general learning strategies similar to the processes at work in native language acquisition--is presently enjoying the greatest amount of attention in the literature on second language learning. Unfortunately, much of the evidence cited in support of this mechanism is far from unequivocal, which raises the disturbing possibility that native-like learning strategies may be invoked to account for any error which is not a totally unambiguous example of one of the other processes. This paper is concerned with the most widely documented source of error in adult second language learning: the intrusion of the native language. The discussion will be confined to the type of interference one frequently encounters in the speech of adult language learners: the application of a grammatical relation of the native language to the morphemes in the second language cf. Weinreich (1953:30). As a first step toward the formulation of a psycholinguistic theory of interlingual interference, I will propose two principles which predict the occurrence of production and perception errors. The examples used to document the operation of these principles will demonstrate that the investigation of interlingual interference offers a means of studying the cognitive processes involved in speech perception.

Any psycholinguistic theory of interlingual interference which lays claims to descriptive adequacy must proceed from the assumption

adult speech is rule governed behavior and that rules, which can be described in the formalism of linguistics, are reflected in cognition. This being the case, a description of the process by which the cognitive basis of what is usually referred to as a linguistic rule in the native language is substituted for its counterpart in the second language must first specify the criteria by which the learner establishes a correspondence between the two rules. The most natural principle, which appears to have the greatest generality is shown in (1).

(1)

Principle 1:

> If the learner views the output of a rule x in the second language to be functionally equivalent to the output structure of a rule y in the native language, then rule y will tend to be applied in contexts where the learner deems x structures appropriate.

I will define functional equivalence as the recognition that the two utterances are equatable in terms of their elocutionary function, i.e., they both negate, question, modify, express a specific proposition such as existence, predication, etc., or a combination of these functions.

To be of any interest, a theory of interlingual interference would also have to contain principles which predict the likelihood of an error occurring once a correspondence has been established. One such predictive principle is formalized in (2).

(2)

Principle 2:

> When the learner employs Principle 1, the maximum possibility of error occurring exists when the formal properties of rules x and y are antithetical.

By formal properties, I mean the set of conditions imposed upon the manner in which a rule operates. In the examples which follow, I will demonstrate that these conditions reflect the mental reality of the rule for the speaker and that they frequently shape the strategies he employs for communicating in the second language. I will present examples of these principles at work in three different language learning contexts.

My first example does not involve a violation of a grammatical rule in the second language, rather it is a semantic error which arises from the incorrect use of a grammatical morpheme. Both English and Hausa, a Chadic language spoken primarily in Nigeria, but also as a lingua franca along the coast of West Africa possess positive and negative questions of the type shown in (3).

(3)

(a) Is your father here? (Positive Question)

(b) Isn't your father here? (Negative Question)

However, Hausa, like Japanese, Hindi and other languages, employs a different set of answers for negative questions than English. The alternatives for English and Hausa are shown in (4).

(4)

English

Q: Isn't your father here?

A: (a) No. (He is not here).

(b) Yes. (He is, in fact, here).

Hausa

Q: Babu tsōhonkà à nân?

Is not father you here?

A: (c) I, babu.

Yes, he is not (here).

(d) $\overline{A}$? $\geq$ a, àkwai.

No, he is (here).

Pope (1974) has argued that (3) and (4) provide evidence for two types of question-answering systems. She designates the system in English a positive-negative system, whereby an answer is negative if it contains sentential negation in the highest clause, and positive if it does not. Hence a No answer to (3a) and (4a) expresses negative disagreement and agreement respectively, and a Yes answer to the same two questions expresses positive agreement and disagreement respectively. In contrast, Hausa is seen as an agreement-disagreement system: an answer agrees if it matches the question with respect to negativity and disagrees if it does not. Thus answer (4c) is an expression of negative agreement and (4d) expresses positive disagreement.

This overly complicated classifactory system obscures a basic generalization about yes/no questions which is apparently true for all languages: that they request an affirmation or denial of the truth value of the proposition being questioned. As a result, Pope's description fails to capture the psychological reality of the linguistic structures in both languages. In fact, the only difference between English yes/no questions and their Hausa counterparts is that both negative and positive yes/no in English request an affirmation or denial of a positive proposition. This condition also holds for Hausa positive yes/no questions, however, negative yes/no questions request affirmation or denial of a negative proposition. If we let Q_E and Q_H represent positive questions in English and

Hausa respectively, and p stand for proposition, then the formal differences between the two systems can be symbolized as follows:

(5)

(a) Q_E, $\sim Q_E = \{p\}$

(b) $Q_H = \{p\}$

(c) $\sim Q_H = \{\sim p\}$

Since negative questions have the same basic functional range in both languages, i.e., they are both used to request information,[2] native speakers of English set up the equation $Q_E = Q_H$ when learning Hausa. However, (5) shows that the formal properties of the rules in each language are diametrically opposed. The result, predictable from Principle 2, is maximal interference, whereby the learner employs his native language answers in response to the Hausa questions. Learners can only correct this error through understanding the mental image of the Hausa structure. It is not sufficient to instruct the student to reverse the answers he would normally employ for the equivalent English structure. He must grasp the notion that the negative question in (6a) has the formal properties shown in (6b).

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[2]Since this discussion is confined to the most common use of negative questions--requesting information--I am purposely ignoring their less frequent functions such as expressing annoyance or disagreement, e.g., "Aren't you ashamed of yourself?" = "You really ought to be ashamed of yourself!" or statements of disbelief, e.g., "Didn't someone call last night?" = "Oh, come on! Admit that someone called last night." When used in these restricted capacities, English negative questions have distinctly different intonation contours. In fairness to Pope, I should note, however, that these usages play an important role in her description, which is based on the presuppositions implied in each case, cf. Pope (1974:486).

(6)

(a) Wannàn ba zàbo ba nè?
that neg. guinea fowl neg. is

"Isn't that a guinea fowl?"

(b) Is it the case [p = that isn't a guinea fowl]?

Among the different types of grammatical interference discussed by Weinreich is the application of various native language order relationships to utterances in the second language (Weinreich: 37-39). Weinreich presents copious examples of this phenomenon without suggesting that it is subject to any regular governance. My hypothesis is that this type of interference is restricted to constructions which embody relationships which, if not universal, are extremely common in many languages of the world. Likely candidates are: basic sentence word order, relative clauses, head noun modification and nominal compounds. I will discuss two cases from Persian and English which demonstrate the operation of the aforementioned principles with some of these constructions.

English and Persian (Farsi) possess similar modification systems in that a noun phrase is composed of a head noun and a modifying adjective--a free morpheme--immediately adjacent to it. However, the formal characteristics of the two systems are completely opposite to one another. The dominant order relationship in English has the head noun, the element which is modified, preceded by the modifier--the adjective, although reduced relative clauses do give rise to participial adjectives which follow the noun. In Persian the modifying element always follows the modified element, except for a few notable exceptions like (7b).

(7)

(a) duxtar - e - ziba
girl linker beautiful

(b) ziba duxtar (rare)
beautiful girl

This relationship is maintained in nominal compounds, regardless whether they are formed with adjectives (8a-c) or nouns (8d).

(8)

(a) gærdæn koluft
neck fat
'a powerful person'

(b) xund særd
blood cold
'cool, indifferent (person)'

(c) šekæm gonde
stomach round
'a fat bellied (person)'

(d) bæčče næne
child nanny
'a momma's boy'

Principle 1 correctly predicts that Persians will apply their rule for modification to English nominal compounds. And, indeed, one of the most common and persistent errors made by Persians learning English is the reversal (predicted by Principle 2) of the order of the two elements which make up the English compound noun, thereby producing errors * belly pot for pot belly and * hot bottle water for hot water bottle.

English and Persian restrictive relative clauses are functionally alike in that they both comment on or qualify a noun phrase. They also display a number of structural similarities: both are right branching structures, both are introduced by subordinators (English by Wh words (relative pronouns), Persians by the clause marker Ke),

end both can, subject to certain conditions not well-understood, be extraposed around a following verb phrase. However, the two languages differ fundamentally with respect to the way in which the antecedent noun phrase of the relative clause is indicated. The native speaker of English expects the antecedent of the clause to appear immediately to the left of the clause introducer. This expectation accounts for the fact that extraposition of the clause in (9a) results in the change of meaning shown in (9b), and the same operation performed on (9c) produces ungrammatical (9d).

(9)

(a) The man who ate my teddy bear shot the girl.

(b) The man shot the girl who ate my teddy bear.

(c) An inmate who was shaving himself watched a girl.

(d) *An inmate watched a girl who was shaving himself.

The native speaker of Persian expects the antecedent to appear as a clitic somewhere within the clause. In (10a) it is the possessive pronoun, ɛš bound to the noun bærodær, in (b) an object which appears after the proposition bɛ, and in (c) it is the same clitic ɛš, functioning now as a direct object pronoun affixed to the noun mologot, "meeting," as part of the compound verb mologot kærdæn "to meet." There is no subject clitic in Persian. Subject focus relative clauses have the structure shown in (d).

(10)

(a) mærd i ke bærodær ɛš o did im ræft ø
man the sub. brother his obj. saw we want he

"The man whose brother we saw left.

(b) mærd i ke bɛ h ɛš kado dad æm ræft ø
man the sub. to him present gave I went he

"The man to whom I gave a present left."

(c) mærd i ke mcloqot ɛš .ærd æm ræft ø
man the sub. meeting him did I went he

"The man who(m) I met left."

(d) xanum ha y i ke tɛnis bazi mi kærd æn (d)
woman pl. the sub. tennis play (n.) were doing they

ræft æn(d)
went they

"The women who were playing tennis left."

The expression of the clause antecedent as a clitic within the clause may be described in terms of a hierarchy cf. Soheili-Isfahani (1975). The clitic is obligatory for possessions and indirect object instructions like (10a) and (10b); it is optional for direct object constructions like (10c), and, as previously mentioned, no clitic is present for subject focus constructions like (10d). The functional and structural similarities are sufficient for the native speaker of Persian to make the inevitable comparison when learning English. The psychological reality of the hierarchy governing the obligatory inclusion of the clitic is reflected in the learner's performance errors. Possessive and dative relative clauses are always rendered with an unnecessary pronoun like (11a) and (b). Object focus clauses frequently receive a correct rendition, but just as frequently include the unnecessary pronoun shown in (11c). English subject focus clauses are almost always correctly produced. When errors occur, they pattern after the example in (11d).

(11)

(a) * The man, who we saw his brother left

(b) * The man who { I gave a present to him / I gave him a present } left

(c) (*) The man who I met (him) left.

(d) (*) The women who (they) were playing tennis left.

One of the best sources of evidence about which syntactic units have the greatest psychological reality in the native language may be the comprehension breakdowns and temporary confusions that the learner experiences in reading a second language. This is because the decoding process we call reading places the learner in a situation which induces him to fall back on native language strategies of perception, and these strategies show us a good deal about the psychological permanence of linguistic concepts utilized in perception. I am assuming an active model of the reading process similar to Goodman's (1967) "psycholinguistic guessing game", whereby the adult reader sets up expectations about the as yet unprocessed portion of the text. These expectations are based on material he has already decoded by deploying one or more appropriate perceptual strategies. When the expectations are not met, then the decoding process breaks down, and the reader is forced to regress and examine the syntactic clues in the text in order to determine what the intended message is. Only by rejecting the strategies which he applied on the first trial will the reader be able to embark upon a course of decoding which results in comprehension. In learning to read a second language, students are frequently guided by native language perceptual strategies; this usually results in at least a temporary breakdown in comprehension. The following example of native speakers of English

learning to read German is typical.

Both English and German have SVO word order, but the latter also has a stylistic OVS variation which is extremely common in prose, particularly in daily newspapers, cf. Popadić (1971). Examples of both orders are shown in (12), where (a) and (b) have the same meaning: "the world needs the artist."

(12)

(a) Die Welt braucht den Künstler.
(subject) (object)

(b) Den Künstler braucht die Welt.
(object) (subject)

These two mirror image word orders pose no problem to the native speaker. He uses the case forms reflected in the different types of noun modifiers to identify nouns as subjects, objects or indirect objects. For example, each of the sentences in (5) contains the neuter noun das Tier, "the animal." The article das is both the accusative and nominative singular case form, so das Tier could be either the subject or the object of (a) and (b). But it is clear that in (a) it is the subject, since the form den marks the masculine noun der Jäger as being in the accusative case and thus the object. In (b) the same process of elimination designates das Tier as the object because the nominative case form, der Jäger, can only be the subject.

(13)

(a) Das Tier sieht aber den Jäger nicht
"But the animal doesn't see the hunter."

(b) Das Tier sieht aber der Jäger nicht.
"But the hunter does not see the animal."

Experimental evidence from investigations into the nature of sentence perception have shown that native speakers of English employ semantic and sequential labeling strategies when processing perceptually difficult constructions like center embedded sentences. Two such strategies, proposed by Bever (1970), which are imposed by native speakers of English in reading a second language are shown in (14).

(14)

(a) Strategy B: The First N... V... N... clause (isolated by another strategy) is the main clause unless the verb is marked as subordinate.

(b) Strategy D: Any Noun-Verb-Noun (NVN) sequence within a potential internal unit in the surface structure corresponds to "actor-action-object."

In learning to read German, native speakers of English persistently apply strategy (2b) whenever the verb is a finite form. Indeed, the anticipation of an SVO order is so firmly established that they will frequently assume that the first noun in the sentence is the subject even when the case signal clearly indicates that this cannot be true. (15a) demonstrates the fact that certain German verbs like folgen "to follow," "to come after," govern the dative case (dem is the dative case form for masculine nouns like der Jäger). In (15b) the dative form dem Studium "a period of study/education" appears in sentence initially because the writer has chosen the OVS word order. Nevertheless, the native speaker of English will invariably fail to register the case signal and assign dem Studium the status of subject, thereby producing the incorrect reading: "the course of study follows a certification examination" instead of the correct translation shown under (b).

(15)

(a) Das Tier folgte dem Jäger.
"The animal followed the hunter."

(b) Dem Studium folgt ein Staatsexam.
"A certification exam comes after the course of study/education."

(c) Die Verbandsinteressen verwalten sechs jüdische
The association's interests supervise (pl.) six Jewish

Rechtsanwälte.
lawyers.

"Six Jewish lawyers supervise the association's interests."

In (c), however, which has the same word order as (b), all clues have been neutralized. The two nouns, Verbandsinteressen and Rechtsanwälte show a plural inflection, and their most immediate modifiers, die and jüdische respectively, are representations of both the nominative and the accusative case. Now, only a knowledge of the semantics of the verb verwalten, i.e., that it is extremely unlikely that anything but human beings can undertake the action expressed, enables the reader to determine the correct (intended) subject--Rechtsanwälte. The native speaker of English will normally impose the SVO order on the sentence with the result that the true subject and object are reversed. Even very proficient readers may be temporarily misled by sentences like (b) and (c).

In this paper I have presented evidence that production and perception errors made by adult second language learners reveal a good deal about the perceptual strategies deployed in the native language, and hence have relevance for the development of a model of speech perception. In some cases, the cognitive characterization of the structures in the native and the second language is elucidated by the error. In the English-Hausa interference case, for example,

the reorientation the native speaker must undertake in order to formulate correct responses to Hausa negative questions involves segmenting the surface structure into units which correspond to the internal meaning-bearing representation of the utterance--the closest thing imaginable to the deep structure of Hausa negative questions. This process of mapping external structures into internal representations is generally acknowledged by psychologists and linguists as central to the meaningful perception of sentences.

It is tempting to argue that examples cited previously provide behavioral evidence which should be added (as a supplementary criterion perhaps) to the steadily growing arsenal of syntactic arguments customarily employed in the justification of linguistic descriptions. We might propose this evidence as part of a naturalness criterion or condition for syntactic descriptions, similar to what has been proposed for phonological descriptions cf. Postal (1968:56-96). We could then contend that the description of yes-no questions formalized in (5) is superior to an alternate description like Pope's, since in addition to agreeing with the linguistic facts, it is simpler and psychologically real, in the sense that it is attested in the type of errors made by second language learners.

Of course, there are numerous reasons why most linguists would dismiss the above proposal out of hand. Two of the more obvious are: in constructing syntactic arguments, linguists do not feel the need to resort to behavioral evidence beyond their own intuitions about sentences, and they would doubtlessly see no reason for introducing behavioral evidence as a supplement to what has now become the generally accepted approach to investigating syntax. Then there is

the question of the validity of the evidence. It could be argued for example, that the examples in this paper merely show that native speakers apply their most strongly felt intuitions about favored surface structure patterns in learning second languages, and quite a few very prominent linguists have long since taken the position that our intuitions about surface structure are of little relevance in the formulation of linguistic descriptions. A linguistic theory which places a premium on simplicity without specifying the limits to be placed on the criteria used for achieving it gives free rein to the linguist's imagination and creativity in devising syntactic arguments. Presumably, only his "linguistic good sense," whatever that may be, is available to curb excesses. Indeed, as long as the goal of linguistic theory remains to characterize the competence of an idealized speaker-hearer (Chomsky, 1964, 1965), it is very likely that we will be treated to new and more sophisticated justifications for linguistic analyses. And it is equally predictable that these new arguments will have little or no relation to the way in which nonidealized adults utilize their intuitions about their language to process perceptually "odd" sentences or in attacking the problem of acquiring a new language.

Does the study of the mechanisms underlying interlingual errors have any theoretical significance at all? I think the answer to this question is clearly: Yes, but not for linguistic theory in its present form. Six years ago, in what must surely be the most significant contribution to psycholinguistics in over a decade, Bever (1970) argued that the cognitive machinery employed in ongoing speech behavior had nothing to do with a linguistic grammar. The grammar that the

speaker must use in speech perception could not, Bever contended, incorporate the artificial distinction of competence vs. performance, rather it must describe adult intuitions about potential sentences in the native language, and such intuitions were not direct behavioral reflections of linguistic knowledge. This point, which was buttressed by an impressive array of evidence from experiments in speech perception, gave an entirely new orientation to psycholinguistic research. The task of the psycholinguists was no longer to seek the performance principles which would explain how an abstract linguistic grammar is translated into verbal behavior, rather it was to investigate how the mechanisms of perception and cognition which underlie various aspects of language become integrated into communicative behavior. It is in pursuing this goal that I believe the investigation of interlingual interference may produce substantial contributions.

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